abnormality,

wherein the information flow describes a development of a predictability of plural future system states.

REMARKS

In the Office Action mailed on December 3, 2002, claims 1-3, 10, and 16-18 were rejected under 35 U.S.C. § 102(b) as being anticipated by Ravdin et al. (U.S. Patent No. 5,862,304) ("Ravdin"); and claims 4-9 and 11-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ravdin in view of Abrams et al. (U.S. Patent No. 6,117,066) ("Abrams"). The foregoing rejections are respectfully traversed.

Claims 1-18 are pending in the subject application, of which claims 1 and 16-18 are independent. Claims 1 and 16-18 are amended herein. Care has been exercised to avoid the introduction of new matter. A Version With Markings To Show Changes Made to the amended claims is included herewith.

Support for Claim Amendments:

Support for the amendments to claims 1 and 16-18 may be found in the Specification at page 1, lines 6-12.

Claim Rejections:

Ravdin discusses a process for predicting a disease or a given medical state, using a neural network. In Ravdin's method of prognosis, a neural network is trained with prognosis data that contains the disease to be prognosticated or the given medical state to be prognosticated. After the training, the neural network is tested to predict the future occurrence of the disease or medical condition (Ravdin, col. 2, lines 46-50). Thus, Ravdin discusses the classic and well-known method of applying a neural network, namely the classification of data with regard to unknown states. Ravdin uses classic, well-known "back-propagation" neural networks and corresponding "back-propagation" training methods (Ravdin, col. 2, lines 51-53). Clearly, Ravdin is based on applying a known neural technique to a specialized medical problem.

In contrast, the present invention determines the abnormality of a system by using the heretofore unknown information flow of the system. According to the present invention, the information flow describes the complexity of the dynamics of a system in order to then determine the abnormality of the system by the application of the information flow. Specifically, claims 1 and 16-18 of the subject application (as amended herein) recite that "the information flow describes a development of a predictability of plural future system states."

The determination of the information flow can take place directly from data, but also with the interposition of a neural network, which is trained with the data and by the application of which the information flow can then be determined. The use of a neural network is purely optional or alternative in the invention. However, the prognosis of a disease or of a medical state is based in Ravdin on the known neural approach, i.e., on the use of a known neural network, and thus on a completely different method than that in the invention. The information flow in the claimed invention is not disclosed or suggested in Ravdin.

The information flow of the present invention makes possible a recognition with high reliability of an abnormal physiological state that is beginning to emerge, because the information flow is independent of the normal changes in the dynamics of a physiological signal. Therefore, independent claims 1 and 16-18 (as amended herein) are patentably distinguishable over Ravdin. Dependent claims 2-3 and 10 are allowable based in part on their dependency, directly or indirectly, from one of independent claims 1 and 16-18.

In addition to being allowable based in part on their dependency from one of allowable independent claims 1 and 16-18, dependent claims 4-9 and 11-15 recite patentably distinguishing features of their own.

Abrams discusses a treatment of given neurological and psychiatric diseases by the use of electrodes for the production of pulsing magnetic fields with variable intensities. However, Abrams does not disclose or suggest the prediction of an abnormal state of a dynamic system in general, nor does Abrams disclose or suggest the determination of an information flow, as recited in the claimed invention.

Further, although the Examiner contends that the rejection sufficiently sets forth the motivation to combine Ravdin and Abrams (Office Action, item 4, pages 3-4), the Examiner is not noting that although any two references may pertain to similar subject matter (although the Applicants do not admit the same herein), that is simply not enough to comply with the requirements of MPEP § 706.02(j). As stated previously, the mere fact that references <u>can</u> be

combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP § 2143.01. Specifically, there must be a suggestion or motivation in the references to make the combination or modification. Id.

Withdrawal of the foregoing rejections is respectfully requested.

There being no further objections or rejections, it is submitted that the application is in condition for allowance, which action is courteously requested. Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters. If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 5-5-2003

By: _____

Matthew Q. Ammon
Registration No. 50,346

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND claims 1 and 16-18. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (FOUR TIMES AMENDED) An arrangement for predicting an abnormality of a dynamic system and for implementing an action opposing the abnormality using a continuous information flow that describes a development of a predictability of several future system states, comprising:

a) a measured data pick-up that registers comparison measured data of said system and test measured data of said system;

b) a processor unit, having a neural network that models said system, said processor unit

(1) training said neural network using said comparison measured data;

(2) determining a comparison information flow that describes a comparison dynamic of said system using said trained neural network;

(3) determining a test information flow that describes a test dynamic of said system using said test measured data;

(4) using said comparison information flow and said test information flow, predicting said abnormality as established when said comparison information flow differs significantly from said test information flow, and predicting said abnormality as not established when said comparison information flow does not significantly differ from said test information flow;

(5) when said abnormality of the system has been predicted as established, then implementing said action; and

c) an actuator that implements said action,

wherein the information flow describes a development of a predictability of plural future system states.

2. (AS TWICE AMENDED) An arrangement according to claim 1, wherein said processor unit endlessly loops from said determining a comparison information flow to said implementing said action.

3. (AS ONCE AMENDED) Arrangement according to claim 1, wherein said abnormality is predicted as established when said test information flow is significantly smaller than said comparison information flow.

4. (AS ONCE AMENDED) An arrangement according to claim 3, wherein said action comprises exciting said system with a chaotic signal.

5. (AS ONCE AMENDED) An arrangement according to claim 4, wherein said action comprises supplying noise to said system.

6. (AS ONCE AMENDED) An arrangement according to claim 5, wherein said noise is supplied by a corresponding electrical field.

7. (AS ONCE AMENDED) An arrangement according to claim 6, wherein said electrical field is supplied by at least one electrode.

8. (AS ONCE AMENDED) An arrangement according to claim 5, wherein said noise is supplied by a corresponding magnetic field.

9. (AS ONCE AMENDED) An arrangement according to claim 8, wherein said magnetic field is supplied by at least one electrode.

10. (AS ONCE AMENDED) An arrangement according to claim 1, wherein said abnormality is predicted as established when said test information flow is significantly greater than said comparison information flow.

11. (AS ONCE AMENDED) An arrangement according to claim 10, wherein said action comprises exciting said system with a regular signal.

12. (AS ONCE AMENDED) An arrangement according to claim 11, wherein said regular signal is supplied by an electrical field.

13. (AS ONCE AMENDED) An arrangement according to claim 11, wherein said electrical field is supplied by at least one electrode.

14. (AS ONCE AMENDED) An arrangement according to claim 11, wherein said regular signal is supplied by a magnetic field.

15. (AS ONCE AMENDED) An arrangement according to claim 14, wherein said magnetic field is supplied to said system by at least one electrode.

16. (FOUR TIMES AMENDED) A method for predicting an abnormality of a dynamic system and for implementing an action opposing the abnormality using a continuous information flow that describes a development of a predictability of several future system states, comprising:

a) measuring comparison measured data of said system and test measured data of said system;

b) determining a neural network that models said system using said comparison measured data;

c) determining a comparison information flow that describes a comparison dynamic of said system using said neural network;

d) determining a test information flow that describes a test dynamic of said system using said test measured data;

e) comparing said comparison information flow to said test information flow using said comparison information flow and said test information flow;

f) determining said abnormality to be predicted as established when said comparison information flow differs significantly from said test information flow;

g) determining said abnormality to be predicted as not established when said comparison information flows does not significantly differ from said test information flow; and

h) implementing said action when said abnormality of said system has been predicted as established,

<u>wherein the information flow describes a development of a predictability of plural future system states</u>.

17. (FOUR TIMES AMENDED) A method for predicting an abnormality of a dynamic system using a continuous information flow that describes a development of a predictability of

several future system states, comprising the steps of:

a) measuring comparison measured data of said system and test measured data of said system;

b) determining a comparison information flow that describes a comparison dynamic of said system using said comparison measured data;

c) determining a test information flow that describes a test dynamic of said system using said test measured data;

d) comparing said comparison information flow to said test information flow using said comparison information flow and said test information flow;

e) determining said abnormality to be predicted as established when said comparison information flow differs significantly from said test information flow; and

f) determining said abnormality to be predicted as not established when said comparison information flow does not significantly differ from said test information flow,

wherein the information flow describes a development of a predictability of plural future system states.

18. (THREE TIMES AMENDED) A method for predicting an abnormality of a dynamic system and for implementing a procedure in response to the abnormality, comprising:

training a neural network to learn the dynamics of a system;

evaluating a continuous information flow received from the system;

predicting an abnormality when the information flow differs significantly from normal state information as determined by the neural network; and

implementing a procedure, if an abnormality is predicted, to prevent or treat the abnormality,

wherein the information flow describes a development of a predictability of plural future system states.